STATUS OF MOUNTAIN LION MANAGEMENT IN NORTH DAKOTA, 2012

North Dakota Game and Fish Department

January 2013

Time Period Covered:

1 July 2011 – 30 June 2012

SUMMARY

We used a combination of reports of occurrence, harvest locations, hunter and trapper questionnaires, and preliminary radiotelemetry investigations to determine the distribution of mountain lions in North Dakota. We examined abundance of mountain lions in relation to previous years (i.e. trend information) via these same methods, as well as previous habitat analysis. Additionally, we necropsied mountain lion carcasses to collect demographic, dietary, and genetic information. Necropsies indicated a healthy population of mountain lions occurring in western North Dakota.

INTRODUCTION

Historically, mountain lions (*Puma concolor*) once ranged over most of North Dakota, although they were considered scarce except in the Badlands region (Bailey 1926). Records indicate mountain lions disappeared from North Dakota in the early-1900s (Bailey et al. [1914] *in* Young and Goldman [1946]) with the last confirmed record of a mountain lion being harvested in 1902 along the Missouri River south of Williston (Bailey 1926). There has never been a bounty on mountain lions in North Dakota (McKenna et al. 2004). In 1961, Adams advised that mountain lions have the potential to show up in North Dakota, particularly the Badlands region. According to Seabloom et al. (1980), there were 10 reports of mountain lions in southwestern North Dakota between 1958 and 1980, and they felt the species should be considered extant in the state. In 1991, after a young female mountain lion was shot near Golva, mountain lions were classified as a "fur-bearer" in the state (North Dakota Century Code 20.1-01). Provisions were made to allow removal of individual mountain lions for protection of property and human safety concerns (North Dakota Century Code 20.1-07-04). Prior to this time, mountain lions were unprotected and could be killed legally (McKenna et al. 2004). By the early-2000s, the number of reports of mountain lion occurrences documented by the North Dakota Game and Fish Department (hereafter, NDGFD) had increased such that it became apparent there was a continued presence of mountain lions in western North Dakota (NDGFD 2006).

Currently, it is recognized that there is a relatively small population of mountain lions occurring in western North Dakota. Occasionally, individual mountain lions are documented in other parts of the state (McKenna et al. 2004, NDGFD 2006, NDGFD 2007). As expected, initial estimates of habitat suitability indicated that the Badlands, Missouri River Breaks, and Killdeer Mountains regions (comprising 6% of total state area) provide suitable habitat for mountain lions (NDGFD 2006).

The first regulated harvest season for mountain lions in North Dakota occurred in 2005-2006 with a quota of 5. This first harvest season was considered experimental with the goal being to acquire biological and distributional information about the population of mountain lions occurring in the state (NDGFD 2006). The second regulated harvest season (2006-2007) was modified to prohibit the harvest of kittens (i.e. mountain lions with visible spots) or females accompanied by kittens. Additionally, harvesters were not allowed to use dogs to pursue mountain lions until later in the season. Changes to the 2007-2008 regulations included dividing the state into 2 management zones (Figure 1; Zone 1 had a quota of 5, Zone 2 had no quota), no longer including incidental or depredation removals in the quota, and Fort Berthold Reservation (hereafter, Reservation) having a separate harvest quota of 5 mountain lions. During the 2008-2009 harvest season, the harvest quota for mountain lions in Zone 1 was increased to 8 while the quota within the Reservation remained 5. The harvest quota in Zone 1 was again increased to 10 in the 2010-2011 and 14 in 2011-2012 harvest seasons.

METHODS

Reports of mountain lion occurrence (e.g. sightings, tracks, etc.) were recorded by NDGFD personnel, and included reports from the general public, deer hunters, fur hunters and trappers, United States Department of Agriculture-Wildlife Services, Theodore Roosevelt National Park, and Reservation Fish and Game employees (Figure 2). Reports were classified as

a. Verified – Evidence available, including a carcass or live-captured mountain lion, photograph or video, DNA analysis results, or tracks, scat, kill or attack confirmed as being that of a mountain lion by a qualified wildlife professional.
b. Probable Unverified – No evidence available, but report, animal description, and/or location are plausible.
c. Improbable Unverified – No evidence available and report, animal description, and/or location are not plausible.
d. Unfounded – Evidence available which disproves the claim that it is a mountain lion, including carcass or live-captured animal, photograph or video, DNA analysis results, or tracks, scat, kill or attack disproved as being that of a mountain lion by a qualified wildlife professional.

We required a mandatory check-in of intact carcasses for all harvested mountain lions. Additionally, we collected data from mountain lions killed on the Reservation. From the mountain lion carcasses, we estimated age (Anderson and Lindzey 2000) and collected morphological measurements, reproductive tracts, stomachs, and tissue samples. We examined reproductive tracts for placental scars. We extracted an upper premolar and sent them to Matson's Laboratory (Milltown, Montana, USA) to confirm age via counts of cementum annuli. Tissue samples from all mountain lion carcasses were sent to the Genetics Laboratory at the United States Forest Service Rocky Mountain Research Station (Missoula, Montana, USA) for analyses.

In early-April 2011, we mailed a questionnaire to 5,000 individuals who bought either a furbearer or combination license for the 2011-2012 harvest season (Tucker 2012). We asked hunters and trappers to indicate the amount of time spent pursuing mountain lions and number of individual mountain lions they harvested. From this, we estimated mean number of days hunting, number of total mountain lions harvested, and counties of most hunting activity.

In 2011, we included in a survey to a random sample of deer hunters a question asking hunters if they saw any mountain lions while hunting deer (Stillings et al. 2012). We summarized visual observations of mountain lions by deer hunting unit.

We began a research project on mountain lions in North Dakota in cooperation with South Dakota State University (SDSU) in August 2011 (Study No. E-XII). The principle investigator for the project from SDSU is Dr. Jonathan Jenks. The research objectives are to 1) estimate survival, home range area, and movements of mountain lions, 2) determine feeding habits and kill rates of mountain lions, and 3) evaluate condition (fat stores, parasite loads) of mountain lion mortalities. For more information, see Report No. C-459.

We estimated minimum breeding range of mountain lions in North Dakota using locations of reproductively active females (≥3 years old and evidence of reproduction) and dependent young (<1 year old) for which the carcasses were available. We determined if a female was reproductively active through examination of external nipples and internal reproductive tracts during necropsy. Locations of reproductively active females and dependent young were buffered using the average home range size for an adult female (140 km^2) as reported in Fecske et al. (2011). The buffers were then combined to estimate the minimum breeding range of mountain lions in North Dakota.

RESULTS

From 1 July 2011-30 June 2012, we recorded 97 reports of mountain lions (Figures 3-4). Of those, 39 reports (34%) were classified as Verified (Table 1, Figures 4-5). The Verified reports consisted of 66% carcasses (i.e. mountain lions harvested during the regulated harvest season, dispatched for protection of property, or incidentally trapped), 15% mountain lion signs (i.e. tracks, scat, kills, or scrapes), and 10% photographs or videos (Table 2). Similar to the past several years, the distribution of Verified mountain lion reports occurred predominantly in western North Dakota, particularly the northern Badlands region (Figure 5).

The hunting season for mountain lions opened on 2 September 2011. Zone 1 had a total quota of 14 mountain lions, whereas Zone 2 had no quota and remained open for hunting until 31 March 2012. In Zone 1, the quota was split between early- and late-seasons. Zone 1 early-season quota was 10 and the late-season quota was 4. Hunters could use hounds to pursue mountain lions only in the late-season. The hunting season in Zone 1 closed after the 14^{th} mountain lion was harvested on 5 December 2011 (Table 3). Additional legal harvests included one mountain lion harvested in Zone 2 and two mountain lions harvested within the Reservation. The total legal harvest consisted of 13 females and 4 males. Methods of take included 11 shot with firearms, 3 pursued with dogs and shot with firearms, and 2 called in using a predator call and shot with a firearm, and 1 shot with a bow and arrow. Additionally, 7 mountain lions (5 females, 2 males) were incidentally snared, 2 females were dispatched for protection of self or property (e.g. livestock), 2 (1 female, 1 male) were incidentally trapped in footholds and then illegally shot, 1 female died from capture myopathy, 1 female kitten was illegally taken during the season, and 1 male was illegally trapped (i.e. trapping was intentional) dying from starvation and/or dehydration.

Majority of mountain lion carcasses (71%) we examined were in good nutritional condition; fat content was at or above expected levels and parasite loads were low. Gross physical injuries included 8 mountain lions (6 females, 2 males) having tears or frostbite on ears, 6 (4 females, 2 males) missing part of their tail, and 3 females being characterized as thin or emaciated. Additionally, 2 mountain lions that were incidentally snared were in poor condition when discovered due to being captured in the snares for prolonged periods.

Results from the questionnaire mailed to furbearer and combination license holders indicated that 2.6% of license holders hunted mountain lions during the 2011-2012 season. Results from the questionnaire also indicated that individual hunters spent an average of 18.7 ± 54.3 ($\bar{x}$ ± SD) days pursuing mountain lions with an estimated statewide harvest of 1 mountain lion during the 2011-2012 hunting season. The questionnaire estimated the counties of most hunting activity were Billings, Cass, Grand Forks, and McKenzie. It is apparent that data obtained from the questionnaire regarding mountain lion hunting activity has wide margins of error and is unreliable in documenting true harvest rates.

Responses from the deer hunter questionnaire resulted in <1% of people indicating they saw a mountain lion while deer hunting (Figure 6). Of those units where mountain lion observations were reported, 3 (3B1, 4B, and 4C) contained habitat considered suitable for a breeding population of mountain lions (NDGFD 2006).

We estimated the minimum breeding range of mountain lions in North Dakota as 2,671 km^2. Of the 106 documented mountain lion mortalities in North Dakota since fall-2004, 39 were classified as reproductively active females or dependent young. Those reproductively active females and dependent young were only found in the northern Badlands and Killdeer Mountains regions of McKenzie and Dunn counties.

DISCUSSION

We monitored mountain lions in North Dakota via reports of occurrence, mandatory carcass check-ins, and harvest surveys. Additionally, we have begun an active research project on mountain lions to determine baseline population information (Study No. E-XII). Our knowledge of mountain lion distribution, population demographics, and health has vastly improved over the past 7 years. However, we are continuing to improve our understanding of vital rates, habitat use, and appropriate survey techniques for mountain lions in North Dakota. Therefore, until more information is known, mountain lions should continue to be monitored closely.

Although we cannot use Verified reports of mountain lion occurrence to document population trends, these reports provide us with valuable information regarding distribution, habitat use, and travel routes, especially those used for dispersal, of mountain lions in North Dakota. We documented reports of mountain lion occurrence in 40% of the counties in North Dakota (Figure 3). However, we verified reports in only 9% of counties (Figure 5). Not surprisingly, we verified the largest number of reports in Dunn (*n* = 19) and McKenzie (*n* = 12) counties, which have the highest proportion of suitable habitat for mountain lions (NDGFD 2006). The number of reports of mountain lion occurrence we documented from 1 July 2011-30 June 2012 was 21% more than the previous fiscal year (Table 3, Figure 4). This is largely the result of an increased number of legally harvested mountain lions and mountain lions killed due to unregulated take (Figure 7).

We also continued to receive a large number of reports from Burleigh and Ward counties, which contain the cities of Bismarck and Minot, respectively (Figure 3). We were more likely to

investigate reports of mountain lion occurrence within these municipalities due to human safety concerns and availability of staff. None of the reports of mountain lions in Burleigh and Ward counties were Verified. In fact, a majority of reports (56%) in Burleigh and Ward counties were Unfounded (i.e. Verified as being something other than a mountain lion). The most common animals that were mistakenly identified as mountain lions were domestic dogs (*Canis familiaris*), especially their tracks, and domestic cats (*Felis catus*).

External and internal examination of mountain lion carcasses indicated mountain lions in North Dakota are generally healthy. The sex ratio of all mountain lion carcasses we have examined to date in North Dakota (n = 106) was 1.5 females per male and age was 2.4 ± 2.1 ($\bar{x}$ ± SD) years. Whereas, the sex ratio of mountain lion carcasses examined from 1 July 2011-30 June 2012 was 2.6 females per male and age was 2.9 ± 2.1 years. Mean weight for mountain lions ≥1 year of age was 86 (range 58, 126) and 115 (range 84, 170) pounds for females and males, respectively.

Despite annual increases in the harvest quota the past two seasons, the number of mountain lion mortalities due to unregulated take has also increased (Figure 7). This is consistent with the findings by CGMWG 2005 and Cooley et al. 2009, who indicated that harvest mortality is additive to other forms of mortality. The amount of mountain lions killed due to protection of property or self is likely related to state regulations and associated agency policies. If people know there are no negative consequences to killing a mountain lion for perceived threats, not only may people be more likely to kill a mountain lion, they may also be more likely to report the killing of a mountain lion. Additionally, mortality of mountain lions is impacted by trapping and snaring seasons for other animals, primarily coyotes and bobcats. Trapping and snaring intensity for coyotes and bobcats is the result of fur prices and winter weather. During 2011-2012, not only were fur prices favorable, mild winter weather provided for optimal trapping and snaring conditions, which both may have contributed to the increased number of mountain lions killed due to unintentional trapping or snaring.

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Table 1. Number of mountain lion reports recorded by classification in North Dakota, 1 January 2004 through 30 June 2012.

Year[a]	Verified[a]	Probable Unverified[b]	Improbable Unverified[c]	Unfounded[d]	Total
2004	12	25	32	5	74
2005	39	89	52	43	223
2006	41	84	57	62	244
2007	69	66	37	55	227
2008	43	52	49	82	226
2009	26	22	32	51	131
2010	18	16	31	55	120
2011	59	5	21	26	111
2012	12	2	11	14	39

[a]Most recent year only includes reports through 30 June.
[b]Evidence available, including a carcass or live-captured mountain lion, photograph or video, DNA analysis results, or tracks, scat, kill or attack confirmed as being that of a mountain lion by a qualified wildlife professional.
[c]No evidence available and the report, animal description, and/or location are plausible.
[d]No evidence available and the report, animal description, and/or location are not plausible.
[e]Evidence available which disproves the claim that it is a mountain lion, including carcass or live-captured animal, photograph or video, DNA analysis results, or tracks, scat, kill or attack disproved as being that of a mountain lion by a qualified wildlife professional.

Table 2. Reports of Verified mountain lion occurrence in North Dakota, 2004-2012.

Year [a]	Sign	Carcass	Visual observation	Incidental capture	Radio collar[b]	Photograph/ Video	Total
2004	4	4	1	0	1	4	14
2005	14	3	13	0	0	1	31
2006	24	8	5	1	0	1	39
2007	37	15	8	0	1	6	67
2008	22	11	5	0	0	5	43
2009	6	13	3	0	0	4	26
2010	3	13	1	0	0	1	18
2011	18	32	2	0	0	6	58
2012	1	10	1	0	0	0	12

[a]Most recent year only includes reports through 30 June.

[b]Locations collected via radiotelemetry as a result of research being conducted in nearby states (e.g. South Dakota).

Table 3. Mountain lion mortalities in North Dakota, 1 July 2011 through 30 June 2012.

ID	Cause of death	Date	Sex	Estimated age class (yr)[a]	Weight (lbs)	County
F75	Legal shooting: Protection of property	8/9/2011	F	1-2	72	McKenzie
F76	Legal Harvest (Zone 1)	9/6/2011	F	1-2	87	McKenzie
F77	Legal Harvest (Zone 1)	9/10/2011	F	3-4	73	McKenzie
F78	Legal Harvest (Zone 1)	9/10/2011	F	1-2	65	McKenzie
F79	Legal Harvest (Zone 1)	9/18/2011	F	3-4		Dunn
M80	Legal Harvest (Zone 1)	9/24/2011	M	3-4	145	Dunn
F81	Legal Harvest (Zone 1)	10/14/2011	F	5-6	98	McKenzie
F82	Legal Harvest (Zone 1)	10/27/2011	F	6-7	88	McKenzie
F83	Legal Harvest (Zone 1)	11/5/2011	F	2-3	88	McKenzie
M84	Legal Harvest (Zone 2)	11/6/2011	M	1-2	105	Emmons
F85	Legal Harvest (Zone 1)	11/8/2011	F	5-7	89	McKenzie
F86	Legal Harvest (Zone 1)	11/12/2011	F	2-3	92	Dunn
F87	Capture myopathy	11/13/2011	F	7-9	105	McKenzie
F88	Illegal shooting	11/15/2011	F	1-2	87	Dunn
F89	Legal Harvest (Zone 1)	12/3/2011	F	1-2	80	Dunn
M90	Legal Harvest (Zone 1)	12/5/2011	M	3-4	128	McKenzie
F91	Legal Harvest (Zone 1)	12/5/2011	F	1-2	104	McKenzie
F92	Legal Harvest (Zone 1)	12/5/2011	F	4-5	89	McKenzie
F93	Legal Harvest (Ft. Berthold Reservation)	12/17/2011	F	3-4	101	Dunn
F94	Legal shooting: Protection of self/property	12/21/2011	F	0-1	38	McKenzie
F95	Incidental snaring	12/31/2011	F	2-3	110	Dunn
M96	Illegal shooting	1/14/2012	M	3-4	105	Dunn
F97	Incidental snaring	1/17/2012	F	4-5	71	McKenzie
F98	Incidental snaring	1/19/2012	F	1-2	72	McKenzie
F99	Incidental snaring	1/16/2012	F	4-5	83	Dunn
F200	Incidental snaring	1/20/2012	F	1-2	86	Dunn
F201	Illegal Harvest (Ft. Berthold Reservation)		F	0-1		
M202	Incidental snaring	2/5/2012	M	2-3	96	Mercer
M203	Incidental snaring	2/11/2012	M	1-2	95	McKenzie
M204	Legal Harvest (Ft. Berthold Reservation)	2/28/2012	M	8-9	157	Dunn
M101	Illegal trapping	3/29/2012	M	2-3		Dunn

[a]When possible, cementum analysis (Matson's Laboratory, Milltown, Montana, USA) was used to determine age estimates. Otherwise, estimates of age followed that of Anderson and Lindzey (2000).

Figure 1. Harvest zones for mountain lions in North Dakota during the 2011-2012 season.

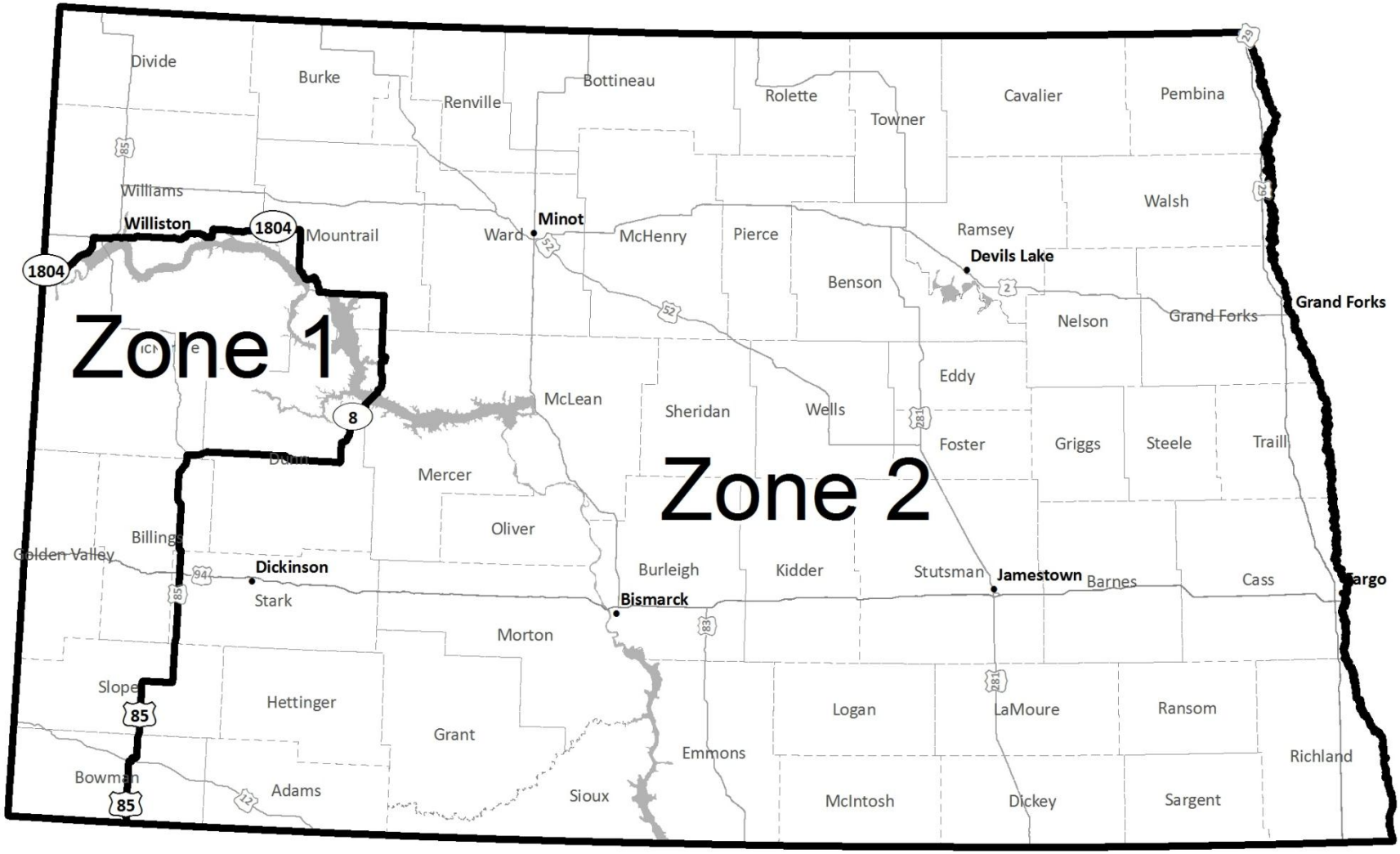
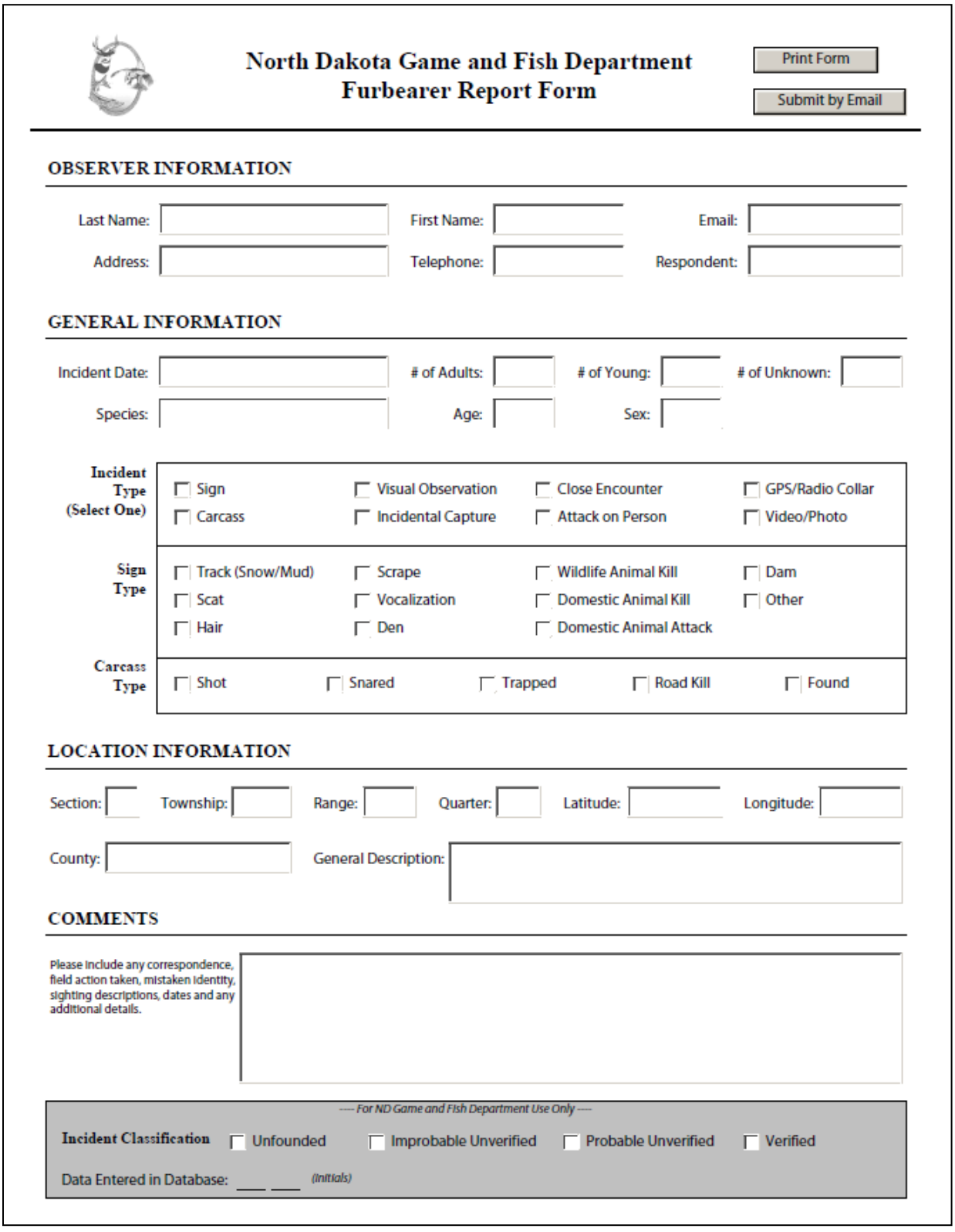


Figure 2. Report form used by North Dakota Game and Fish Department personnel to document the occurrence of mountain lions in the state.



North Dakota Game and Fish Department
Furbearer Report Form

Print Form
Submit by Email

OBSERVER INFORMATION

Last Name: First Name: Email:
Address: Telephone: Respondent:

GENERAL INFORMATION

Incident Date: # of Adults: # of Young: # of Unknown:
Species: Age: Sex:

Incident Type (Select One)

☐ Sign ☐ Visual Observation ☐ Close Encounter ☐ GPS/Radio Collar
☐ Carcass ☐ Incidental Capture ☐ Attack on Person ☐ Video/Photo

Sign Type

☐ Track (Snow/Mud) ☐ Scrape ☐ Wildlife Animal Kill ☐ Dam
☐ Scat ☐ Vocalization ☐ Domestic Animal Kill ☐ Other
☐ Hair ☐ Den ☐ Domestic Animal Attack

Carcass Type

☐ Shot ☐ Snared ☐ Trapped ☐ Road Kill ☐ Found

LOCATION INFORMATION

Section: Township: Range: Quarter: Latitude: Longitude:
County: General Description:

COMMENTS

Please include any correspondence, field action taken, mistaken identity, sighting descriptions, dates and any additional details.

---- For ND Game and Fish Department Use Only ----

Incident Classification ☐ Unfounded ☐ Improbable Unverified ☐ Probable Unverified ☐ Verified

Data Entered in Database: ___ ___ *(Initials)*

Figure 3. Number of reports of mountain lion occurrence in North Dakota, 1 July 2011 through 30 June 2012.

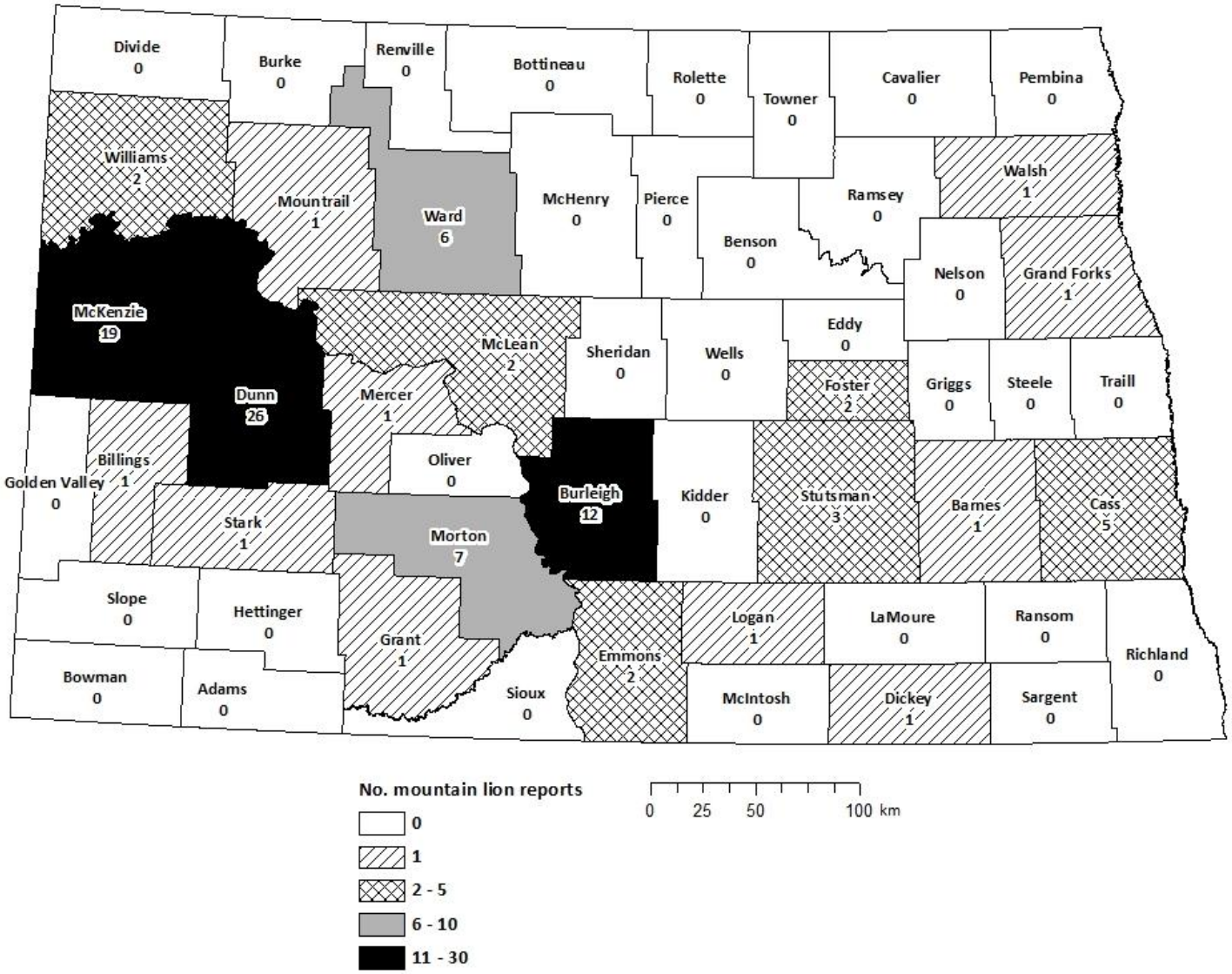


Figure 4. Number of reports of mountain lion occurrence in North Dakota, 2004-2012. Reports of occurrence were classified as Unfounded (evidence available to disprove the occurrence of a mountain lion), Unverified (no evidence available to prove or disprove the occurrence of a mountain lion, and Verified (evidence available to prove the occurrence of a mountain lion). *Note, the most recent column only includes reports through 30 June.

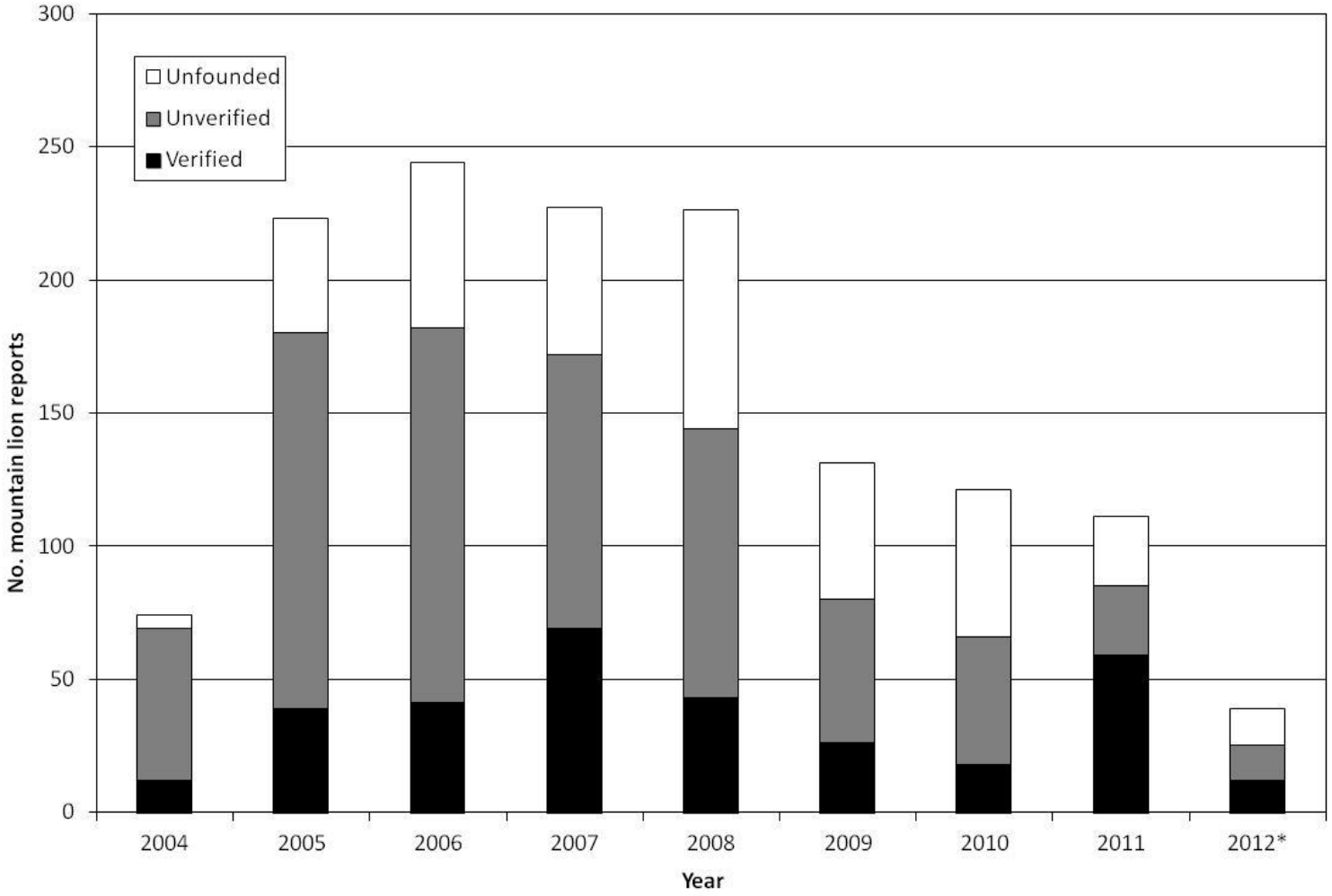


Figure 5. Locations of Verified reports of mountain lion occurrence in North Dakota, 1 July 2011 through 30 June 2012.

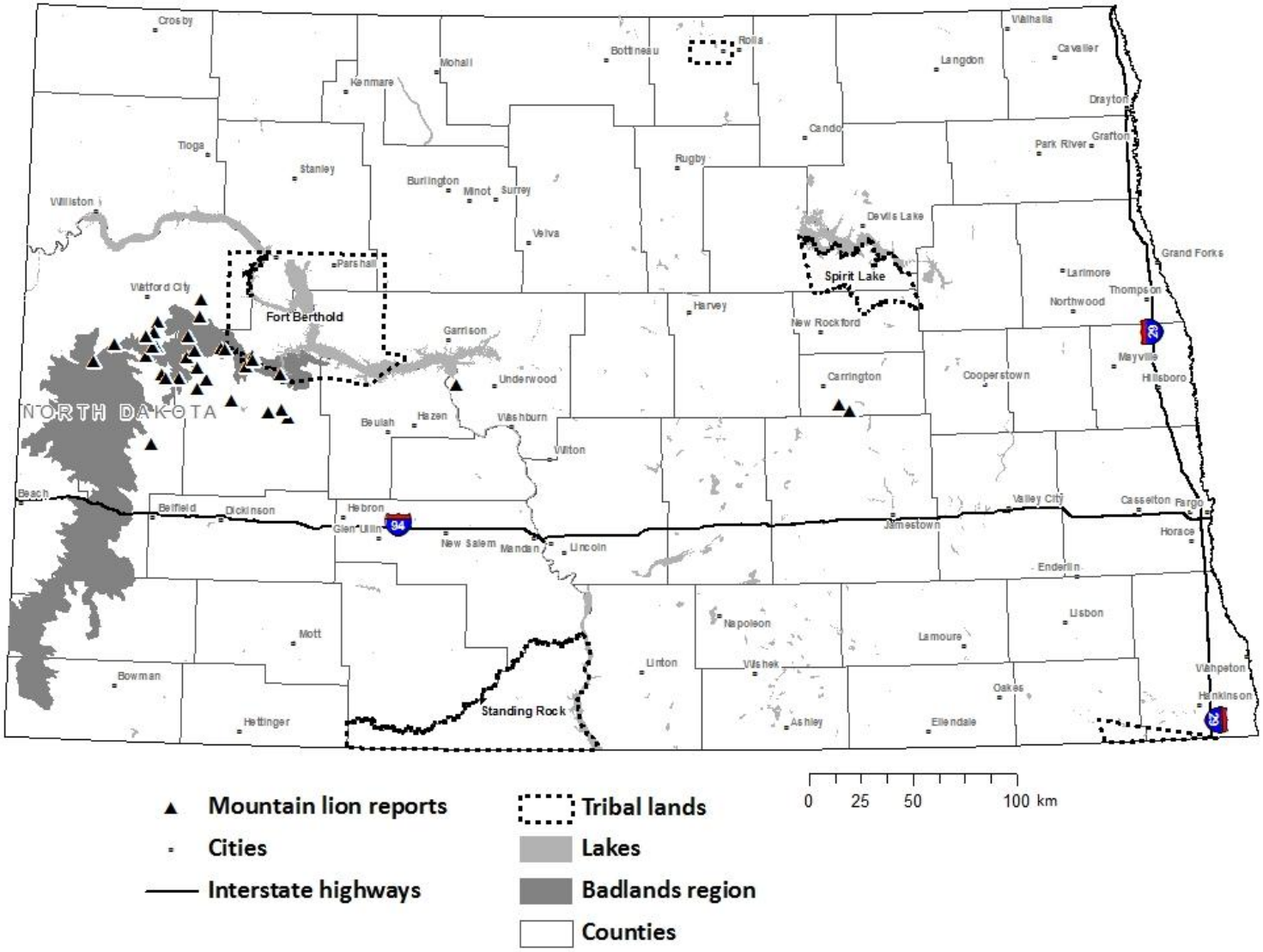


Figure 6. Deer management units where hunters reported observing a mountain lion while deer hunting in North Dakota, 2011.

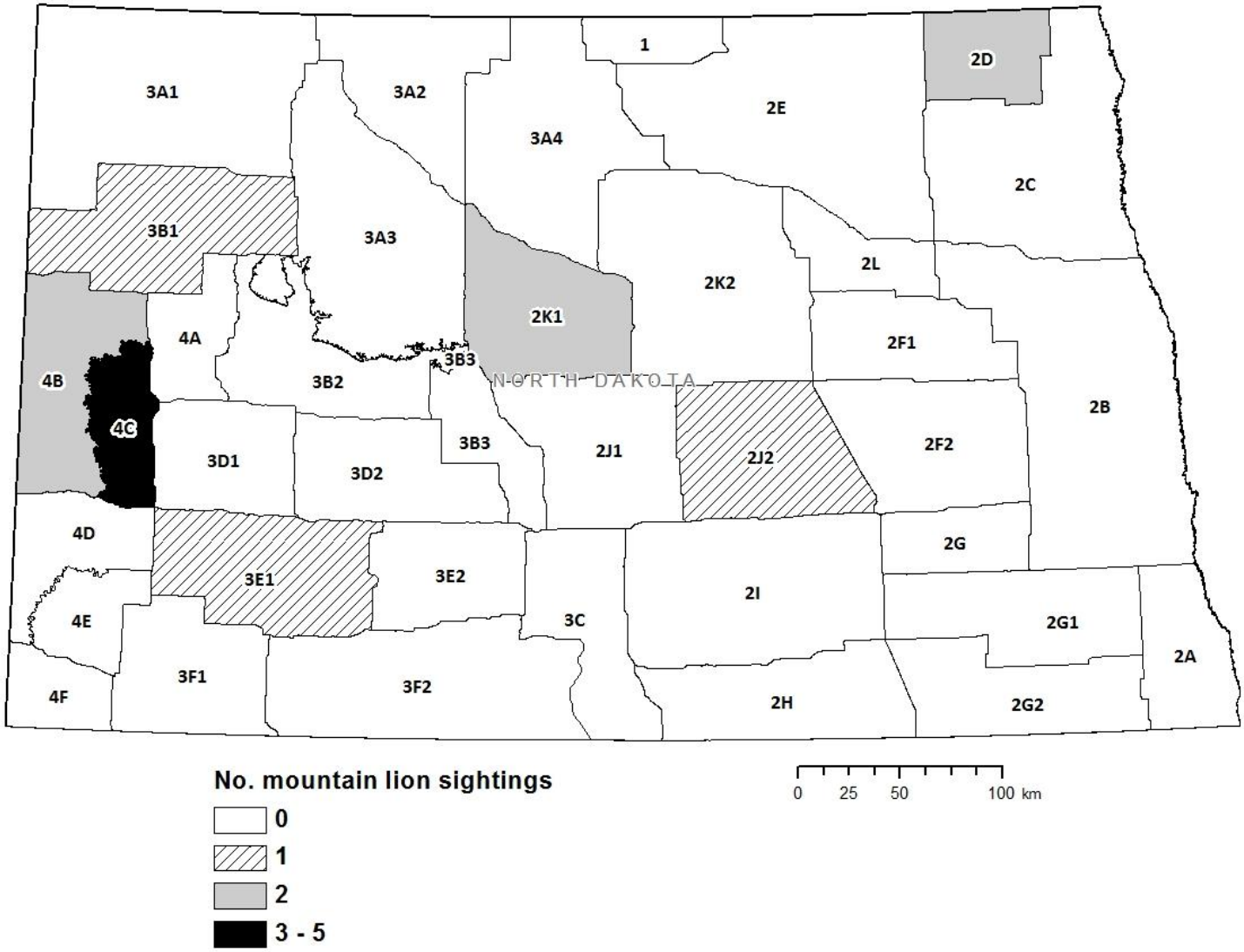


Figure 7. Number of documented mountain lion mortalities due to legal harvest, illegal harvest, protection of property or self, and incidental trapping or snaring in North Dakota, 2005-2012.